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Tetsuya Tohdo

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NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203

EXAMINER

CHEN, QING

ART UNIT

PAPER NUMBER

2191

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/779,703

Applicant(s)

TOHDO ET AL.

Examiner

Qing Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-13 and 15-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-13 and 15-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

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DETAILED ACTION

1. This Office action is in response to the amendment filed on September 4, 2007.
2. **Claims 1, 3-13, and 15-31** are pending.
3. **Claims 1, 3-13, and 15-31** have been amended.
4. **Claims 2 and 14** have been cancelled.
5. The objections to Claims 1, 3-11, 13, 15-23, and 25-31 are withdrawn in view of Applicant's amendments to the claims. The objections to Claims 2 and 14 are withdrawn in view of Applicant's cancellation of the claims. However, Applicant's amendments to the claims fail to fully address the objections to Claims 12 and 24 due to improper antecedent basis. Accordingly, these objections are maintained and further explained below.
6. The 35 U.S.C. § 112, second paragraph, rejections of Claims 2-5, 10, 14-22, and 25-31 are withdrawn in view of Applicant's amendments to the claims. However, Applicant's amendments to the claims fail to address the rejections of Claims 11 and 23 due to insufficient antecedent basis. Accordingly, these rejections are maintained and further explained below.
7. The 35 U.S.C. § 101 rejections of Claims 13-31 are withdrawn in view of Applicant's arguments and amendments to the claims.

Response to Amendment

8. **Claims 5, 12, 16, 17, and 24** are objected to because of the following informalities:
 - **Claim 5** recites the limitation "the individual corresponding operation results."Applicant is advised to change this limitation to read "each of corresponding operation results" for the purpose of keeping the claim language consistent throughout the claims.

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- **Claim 12** contains a typographical error: "the program execution" should read -- the program execution section --.
- **Claims 12 and 24** contain a typographical error: "the operation result" should read -- the operation results --.
- **Claims 16 and 17** contain a typographical error: "the synchronizing means causes simulation means and the program execution means operate in a synchronized manner" should read -- the synchronizing means causes simulation means and the program execution means *to* operate in a synchronized manner --.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. **Claims 1, 3-13, and 15-31** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 13, 25, and 29 recite the limitation "similar contents." The term "similar" is a relative term, which renders the claims indefinite. The term "similar" is not defined by the claims nor does the specification provide a standard for ascertaining the requisite degree and one of ordinary skill in the art would not be able to reasonably determine the scope of the invention. In

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the interest of compact prosecution, the Examiner subsequently does not give any patentable weight to this limitation for the purpose of further examination.

Claims 3-12 depend on Claim 1 and, therefore, suffer the same deficiency as Claim 1.

Claims 15-24 depend on Claim 13 and, therefore, suffer the same deficiency as Claim 13.

Claims 26-28 depend on Claim 25 and, therefore, suffer the same deficiency as Claim 25.

Claims 30 and 31 depend on Claim 29 and, therefore, suffer the same deficiency as Claim 29.

Claims 11 and 23 recite the limitation "the variable values." There is insufficient antecedent basis for this limitation in the claims. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "variable values" for the purpose of further examination.

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Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. **Claims 1 and 6-8** are rejected under 35 U.S.C. 102(e) as being anticipated by US **6,708,329 (hereinafter Whitehill)**.

As per **Claim 1**, Whitehill discloses:

- producing operation results of a simulator which simulates operation of the control model and operation results of program execution section which executes the control program, while making a relational linkage between each of corresponding operation results (*see Column 4: 25-49, "Once the simulation is verified ..." and "The target system is subsequently tested and compared to the simulation to verify target system operation." and "... the simulation modules are directly translated into target modules (e.g., modules compatible with and executable on a target system platform), thereby enabling the simulation tool to be utilized for system definition and requirements and software development."*); and
- testing presence or absence of abnormality in at least one of the control model and the control program with respect to each relational linkage (*see Column 6: 11-13, "When errors are encountered between actual and simulated results ..."*);

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- wherein said each relational linkage is made about similar contents between the control model and the control program based on correspondence information which indicates a correspondence relationship between the control model which is provided at automatic generation of the control program by the automatic code generator and the control program which is produced from the control model (*see Column 6: 38-51, "Templates 38 basically serve as a target module shell or skeleton, and initially contain information and code needed within target modules." and "Function set 40 is utilized to replicate on the target system platform simulation tool functions residing within the simulation modules. The function set basically performs substantially the same tasks as the corresponding simulation tool functions, but is modified for compatibility with the target system platform."*).

As per **Claim 6**, the rejection of **Claim 2** is incorporated; and Whitehill further discloses:

- wherein the testing of the presence or absence of abnormality is implemented by a comparator which compares successively between the operation results of the simulator and the operation results of the program execution section in relational linkage (*see Column 9: 16-23, "The resulting templates are searched at step 94 to replace specific functions with functions compatible with the target system platform."*).

As per **Claim 7**, the rejection of **Claim 6** is incorporated; and Whitehill further discloses:

- wherein the successive comparison between the operation results of the simulator and the operation results of the program execution section by the comparator is implemented in terms of comparison between simulation sequence of the control model and execution sequence of the

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control program based on the correspondence information (*see Column 9: 16-23, "The resulting templates are searched at step 94 to replace specific functions with functions compatible with the target system platform."*).

As per **Claim 8**, the rejection of **Claim 6** is incorporated; and Whitehill further discloses:

- wherein the successive comparison between the operation results of the simulator and the operation results of the program execution section by the comparator is implemented in terms of comparison between variable values which are calculated by the simulation of the control model and variable values which are calculated by the execution of the control program based on the correspondence information (*see Column 9: 16-23, "... certain functions in the simulation tool define data streams in a particular manner. These functions are replaced with functions (e.g., typically included within function set 40) for compatibility with the target system platform to enable information to be transferred between functional elements."*).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. **Claims 3-5, 9-12, and 25-31** are rejected under 35 U.S.C. 103(a) as being unpatentable over Whitehill in view of US 6,587,995 (hereinafter Duboc).

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As per **Claim 3**, the rejection of **Claim 1** is incorporated; however, Whitehill does not disclose:

- wherein the relational linkage is made for one of the control model and the control program based on the setting of a break point which specifies a suspend point of operation and for the other based on a setting of a corresponding break point based on the correspondence information.

Duboc discloses:

- wherein the relational linkage is made for one of the control model and the control program based on the setting of a break point which specifies a suspend point of operation and for the other based on a setting of a corresponding break point based on the correspondence information (*see Column 5: 6-15, "A debug operation may include any number of debugging functions, including for example, single-step operations and multi-step operations for use in performing step-wise simulation, breakpoint operations to halt a simulation on occurrence of specific events ..."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the relational linkage is made for one of the control model and the control program based on the setting of a break point which specifies a suspend point of operation and for the other based on a setting of a corresponding break point based on the correspondence information. The modification would be obvious because one of ordinary skill in the art would

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be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

As per **Claim 4**, the rejection of **Claim 3** is incorporated; however, Whitehill does not disclose:

- wherein the break point is adapted to set individually for functional blocks which constitute the control model.

Duboc discloses:

- wherein the break point is adapted to set individually for functional blocks which constitute the control model (*see Column 11: 48-51, "Window 110 may include a number of breakpoint selection controls 112 that permit a user to select various conditional breakpoints at which to stop execution of a simulation."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the break point is adapted to set individually for functional blocks which constitute the control model. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

As per **Claim 5**, the rejection of **Claim 1** is incorporated; however, Whitehill does not disclose:

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- wherein output of operation results, with the relational linkage being made between each of corresponding operation results, is implemented based on the execution and suspend of the control program, one line at a time, by the program execution section.

Duboc discloses:

- wherein output of operation results, with the relational linkage being made between each of corresponding operation results, is implemented based on the execution and suspend of the control program, one line at a time, by the program execution section (*see Column 5: 6-15, "A debug operation may include any number of debugging functions, including for example, single-step operations and multi-step operations for use in performing step-wise simulation ..."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein output of operation results, with the relational linkage being made between each of corresponding operation results, is implemented based on the execution and suspend of the control program, one line at a time, by the program execution section. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

As per **Claim 9**, the rejection of **Claim 8** is incorporated; however, Whitehill does not disclose:

- wherein the testing of the presence or absence of abnormality by comparison between the variable values which are calculated by the simulation of the control model and the variable values which are calculated by the execution of the control program based on the correspondence

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information is implemented in terms of determination as to whether or not the difference between the variable values calculated by the simulation of the control model and the variable values calculated by the execution of the control program is within an allowable range.

Duboc discloses:

- wherein the testing of the presence or absence of abnormality by comparison between the variable values which are calculated by the simulation of the control model and the variable values which are calculated by the execution of the control program based on the correspondence information is implemented in terms of determination as to whether or not the difference between the variable values calculated by the simulation of the control model and the variable values calculated by the execution of the control program is within an allowable range (*see Column 14: 31-43, "... more complex breakpoint conditions may be used, e.g., whether a monitored node has a state that is greater than or less than a certain value, whether the monitored node has a state in a certain range, etc."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the testing of the presence or absence of abnormality by comparison between the variable values which are calculated by the simulation of the control model and the variable values which are calculated by the execution of the control program based on the correspondence information is implemented in terms of determination as to whether or not the difference between the variable values calculated by the simulation of the control model and the variable values calculated by the execution of the control program is within an allowable range. The modification would be obvious because one of ordinary skill in the art would be motivated to

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verify the proper interaction of the core with other components in a design (see Duboc – Column 2: 46-51).

As per **Claim 10**, the rejection of **Claim 6** is incorporated; however, Whitehill does not disclose:

- producing, in the event of determination of the presence of abnormality by the comparator, a simulation spot of the control model and an execution spot of the control program at a time point of the determination as a result of the test.

Duboc discloses:

- producing, in the event of determination of the presence of abnormality by the comparator, a simulation spot of the control model and an execution spot of the control program at a time point of the determination as a result of the test (see Column 14: 44-52, "Once all active breakpoints have been tested, block 236 determines whether any breakpoint was hit. If so, control passes to block 224 to halt the simulation. In addition, it may be desirable to pass a message to the script via the message pipe to indicate that the breakpoint was hit. If no breakpoint is hit, however, block 236 passes control to block 204 to indicate the end of a clock cycle, whereby control then returns to block 200 to wait for the next cycle of the simulation.").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include producing, in the event of determination of the presence of abnormality by the comparator, a simulation spot of the control model and an execution spot of the control program at a time point of the determination as a result of the test. The modification would be obvious

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because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

As per **Claim 11**, the rejection of **Claim 1** is incorporated; however, Whitehill does not disclose:

- making alterable at least one of variable values held at a suspend point among variable values calculated by the simulation of the control model and variable values held at the suspend point among variable values calculated by the execution of the control program when the simulation of the control model and the execution of the control program are suspended during the test.

Duboc discloses:

- making alterable at least one of variable values held at a suspend point among variable values calculated by the simulation of the control model and variable values held at the suspend point among variable values calculated by the execution of the control program when the simulation of the control model and the execution of the control program are suspended during the test (*see Column 14: 10-15, "Next, block 222 determines whether the single-step mode is activated. If so, control passes to block 224 to halt the simulation and return control to the user to either update the debug parameters, view the current results, or perform other activities until the user specifically commands the simulator to restart the simulation on the next clock cycle."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to

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include making alterable at least one of variable values held at a suspend point among variable values calculated by the simulation of the control model and variable values held at the suspend point among variable values calculated by the execution of the control program when the simulation of the control model and the execution of the control program are suspended during the test. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (see Duboc – Column 2: 46-51).

As per **Claim 12**, the rejection of **Claim 1** is incorporated; however, Whitehill does not disclose:

- producing at least the operation results of the simulator which simulates the operation of the control model and the operation results of the program execution section which executes the control program to a display to display visually.

Duboc discloses:

- producing at least the operation results of the simulator which simulates the operation of the control model and the operation results of the program execution section which executes the control program to a display to display visually (see Column 7: 39-45, “Communication between the debug GUI script 44 and debug monitor 52 is provided through a communications channel 54, with debug parameters used to configure the debug monitor transmitted from the debug GUI script 44 to the debug monitor, and with results of the debug operations transmitted by the debug monitor 52 to the script for display to the user.”).

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Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include producing at least the operation results of the simulator which simulates the operation of the control model and the operation results of the program execution section which executes the control program to a display to display visually. The modification would be obvious because one of ordinary skill in the art would be motivated to provide user with test information.

As per **Claim 25**, Whitehill discloses:

- testing presence or absence of abnormality in at least one of the control model and the control program (*see Column 6: 11-13, "When errors are encountered between actual and simulated results ..."*);
- generating, from information provided at automatic generation of the control program, correspondence information which indicates a correspondence relationship between the control model and the control program, and making a relational linkage between each operation of a simulator which simulates the control model and a corresponding operation of program execution section which executes the control program based on the correspondence information (*see Column 6: 38-51, "Templates 38 basically serve as a target module shell or skeleton, and initially contain information and code needed within target modules." and "Function set 40 is utilized to replicate on the target system platform simulation tool functions residing within the simulation modules. The function set basically performs substantially the same tasks as the corresponding simulation tool functions, but is modified for compatibility with the target system platform."*);

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- directing the simulator and the program execution section to proceed to the simulation and the program execution (*see Column 4: 25-49, "Once the simulation is verified ..." and "The target system is subsequently tested and compared to the simulation to verify target system operation."*); and

- comparing a simulation result of the control model and an execution result of the control program, and testing the presence or absence of abnormality based on the comparison result with respect to each relational linkage (*see Column 4: 39-41, "The target system is subsequently tested and compared to the simulation to verify target system operation."; Column 6: 11-13, "When errors are encountered between actual and simulated results ..."*);

- wherein said each relational linkage is made about similar contents between the control model and the control program based on correspondence information which indicates a correspondence relationship between the control model which is provided at automatic generation of the control program by the automatic code generator and the control program which is produced from the control model (*see Column 6: 38-51, "Templates 38 basically serve as a target module shell or skeleton, and initially contain information and code needed within target modules." and "Function set 40 is utilized to replicate on the target system platform simulation tool functions residing within the simulation modules. The function set basically performs substantially the same tasks as the corresponding simulation tool functions, but is modified for compatibility with the target system platform."*).

However, Whitehill does not disclose:

- a plurality of suspend points of operation of a simulator and a plurality of suspend points of operation of program execution section; and

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- detecting a suspend of the simulator and a suspend of the program execution section following the simulation and program execution.

Duboc discloses:

- a plurality of suspend points of operation of a simulator and a plurality of suspend points of operation of program execution section (*see Column 5: 6-15, "A debug operation may include any number of debugging functions, including for example, single-step operations and multi-step operations for use in performing step-wise simulation, breakpoint operations to halt a simulation on occurrence of specific events ..."*); and

- detecting a suspend of the simulator and a suspend of the program execution section following the simulation and program execution (*see Column 11: 48-51, "Window 110 may include a number of breakpoint selection controls 112 that permit a user to select various conditional breakpoints at which to stop execution of a simulation."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include a plurality of suspend points of operation of a simulator and a plurality of suspend points of operation of program execution section; and detecting a suspend of the simulator and a suspend of the program execution section following the simulation and program execution. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc -- Column 2: 46-51*).

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As per **Claim 26**, the rejection of **Claim 25** is incorporated; and Whitehill further discloses:

- wherein the correspondence information includes execution position correspondence information which is information indicating the relationship between corresponding positions of the control model and the control program *(see Column 6: 38-51, "Templates 38 basically serve as a target module shell or skeleton, and initially contain information and code needed within target modules." and "Function set 40 is utilized to replicate on the target system platform simulation tool functions residing within the simulation modules. The function set basically performs substantially the same tasks as the corresponding simulation tool functions, but is modified for compatibility with the target system platform.")*.

However, Whitehill does not disclose:

- wherein the making of a relational linkage of suspend points based on the correspondence information is that which sets, by being rendered the setting of a break point which specifies a suspend point of operation of one of the simulator and the program execution section, a break point which specifies a corresponding spot of the other based on the execution position correspondence information.

Duboc discloses:

- wherein the making of a relational linkage of suspend points based on the correspondence information is that which sets, by being rendered the setting of a break point which specifies a suspend point of operation of one of the simulator and the program execution section, a break point which specifies a corresponding spot of the other based on the execution position correspondence information *(see Column 5: 6-15, "A debug operation may include any*

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number of debugging functions, including for example, single-step operations and multi-step operations for use in performing step-wise simulation, breakpoint operations to halt a simulation on occurrence of specific events ...").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the making of a relational linkage of suspend points based on the correspondence information is that which sets, by being rendered the setting of a break point which specifies a suspend point of operation of one of the simulator and the program execution section, a break point which specifies a corresponding spot of the other based on the execution position correspondence information. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (see Duboc – Column 2: 46-51).

As per **Claim 27**, the rejection of **Claim 26** is incorporated; however, Whitehill does not disclose:

- wherein the testing of the presence or absence of abnormality based on the comparison result tests the presence or absence of abnormality by at least comparing one of the suspend points of simulation of the control model and one of the suspend points of execution of the control program based on the execution position correspondence information.

Duboc discloses:

- wherein the testing of the presence or absence of abnormality based on the comparison result tests the presence or absence of abnormality by at least comparing one of the

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suspend points of simulation of the control model and one of the suspend points of execution of the control program based on the execution position correspondence information (*see Column 14: 44-52, "Once all active breakpoints have been tested, block 236 determines whether any breakpoint was hit. If so, control passes to block 224 to halt the simulation. In addition, it may be desirable to pass a message to the script via the message pipe to indicate that the breakpoint was hit. If no breakpoint is hit, however, block 236 passes control to block 204 to indicate the end of a clock cycle, whereby control then returns to block 200 to wait for the next cycle of the simulation."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the testing of the presence or absence of abnormality based on the comparison result tests the presence or absence of abnormality by at least comparing one of the suspend points of simulation of the control model and one of the suspend points of execution of the control program based on the execution position correspondence information. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

As per **Claim 28**, the rejection of **Claim 25** is incorporated; and Whitehill further discloses:

- wherein the correspondence information includes variable correspondence information which indicates a correspondence relationship between variable values pertaining to processing of the control model and variable values pertaining to processing of the control

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program (see Column 9: 16-23, "... certain functions in the simulation tool define data streams in a particular manner. These functions are replaced with functions (e.g., typically included within function set 40) for compatibility with the target system platform to enable information to be transferred between functional elements."), and

- wherein the testing of the presence or absence of abnormality based on the comparison result tests the presence or absence of abnormality by at least comparing the variable values calculated by the simulation of the control model and the variable values calculated by the execution of the control program based on the variable correspondence information (see Column 9: 16-23, "... certain functions in the simulation tool define data streams in a particular manner. These functions are replaced with functions (e.g., typically included within function set 40) for compatibility with the target system platform to enable information to be transferred between functional elements.").

As per **Claim 29**, Whitehill discloses:

- testing of presence or absence of abnormality in at least one of the control model and the control program (see Column 6: 11-13, "When errors are encountered between actual and simulated results ...");

- generating, from information provided at automatic generation of the control program, correspondence information which indicates correspondence relationship between the control model and the control program, and making a relational linkage between each operation of a simulator which simulates the control model and a corresponding operation of program execution section which executes the program based on the correspondence information, the

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testing of presence or absence of abnormality in at least one of the control model and the control program being made with respect to each relational linkage (*see Column 6: 38-51, "Templates 38 basically serve as a target module shell or skeleton, and initially contain information and code needed within target modules." and "Function set 40 is utilized to replicate on the target system platform simulation tool functions residing within the simulation modules. The function set basically performs substantially the same tasks as the corresponding simulation tool functions, but is modified for compatibility with the target system platform."*);

- directing the simulator and the program execution section to proceed to the simulation and the program execution (*see Column 4: 25-49, "Once the simulation is verified ..." and "The target system is subsequently tested and compared to the simulation to verify target system operation."*); and

- producing a simulation result of the simulator and an execution result of the program execution section (*see Column 4: 39-41, "The target system is subsequently tested and compared to the simulation to verify target system operation."; Column 6: 11-13, "When errors are encountered between actual and simulated results ..."*);

- wherein said each relational linkage is made about similar contents between the control model and the control program based on correspondence information which indicates a correspondence relationship between the control model which is provided at automatic generation of the control program by the automatic code generator and the control program which is produced from the control model (*see Column 6: 38-51, "Templates 38 basically serve as a target module shell or skeleton, and initially contain information and code needed within target modules." and "Function set 40 is utilized to replicate on the target system platform*

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simulation tool functions residing within the simulation modules. The function set basically performs substantially the same tasks as the corresponding simulation tool functions, but is modified for compatibility with the target system platform. ").

However, Whitehill does not disclose:

- a plurality of suspend points of operation of a simulator and a plurality of suspend points of operation of program execution section; and
- detecting a suspend of the simulator and a suspend of the program execution section following the simulation and program execution.

Duboc discloses:

- a plurality of suspend points of operation of a simulator and a plurality of suspend points of operation of program execution section (*see Column 5: 6-15, "A debug operation may include any number of debugging functions, including for example, single-step operations and multi-step operations for use in performing step-wise simulation, breakpoint operations to halt a simulation on occurrence of specific events ... "*); and
- detecting a suspend of the simulator and a suspend of the program execution section following the simulation and program execution (*see Column 11: 48-51, "Window 110 may include a number of breakpoint selection controls 112 that permit a user to select various conditional breakpoints at which to stop execution of a simulation. "*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include a plurality of suspend points of operation of a simulator and a plurality of suspend points of operation of program execution section; and detecting a suspend of the simulator and a

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suspend of the program execution section following the simulation and program execution. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (see Duboc – Column 2: 46-51).

As per **Claim 30**, the rejection of **Claim 29** is incorporated; however, Whitehill does not disclose:

- wherein the producing of the simulation result of the simulator and the execution result of the program execution section comprises producing operation results to a display to display visually.

Duboc discloses:

- wherein the producing of the simulation result of the simulator and the execution result of the program execution section comprises producing operation results to a display to display visually (see Column 7: 39-45, “Communication between the debug GUI script 44 and debug monitor 52 is provided through a communications channel 54, with debug parameters used to configure the debug monitor transmitted from the debug GUI script 44 to the debug monitor, and with results of the debug operations transmitted by the debug monitor 52 to the script for display to the user.”).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the producing of the simulation result of the simulator and the execution result of the program execution section comprises producing operation results to a display to display

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visually. The modification would be obvious because one of ordinary skill in the art would be motivated to provide user with test information.

As per **Claim 31**, the rejection of **Claim 29** is incorporated; and Whitehill further discloses:

- wherein the correspondence information includes execution position correspondence information which is information indicating the relationship between corresponding positions of the control model and the control program (*see Column 6: 38-51, "Templates 38 basically serve as a target module shell or skeleton, and initially contain information and code needed within target modules." and "Function set 40 is utilized to replicate on the target system platform simulation tool functions residing within the simulation modules. The function set basically performs substantially the same tasks as the corresponding simulation tool functions, but is modified for compatibility with the target system platform."*).

However, Whitehill does not disclose:

- wherein the making of a relational linkage of suspend points based on the correspondence information is designed to set, by being rendered the setting of a break point which specifies a suspend point of operation of one of the simulator and the program execution section, a break point which specifies a corresponding spot of the other based on the execution position correspondence information.

Duboc discloses:

- wherein the making of a relational linkage of suspend points based on the correspondence information is designed to set, by being rendered the setting of a break point

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which specifies a suspend point of operation of one of the simulator and the program execution section, a break point which specifies a corresponding spot of the other based on the execution position correspondence information (*see Column 5: 6-15, "A debug operation may include any number of debugging functions, including for example, single-step operations and multi-step operations for use in performing step-wise simulation, breakpoint operations to halt a simulation on occurrence of specific events ..."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the making of a relational linkage of suspend points based on the correspondence information is designed to set, by being rendered the setting of a break point which specifies a suspend point of operation of one of the simulator and the program execution section, a break point which specifies a corresponding spot of the other based on the execution position correspondence information. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

15. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Whitehill in view of US 2002/0174415 (hereinafter Hines).

As per **Claim 13**, Whitehill discloses:

- synchronizing means which produces operation results of simulation means which simulates operation of the control model and operation results of program execution means

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which executes the control program, while making a relational linkage between each of corresponding operation results (*see Column 4: 25-49, "Once the simulation is verified ..." and "The target system is subsequently tested and compared to the simulation to verify target system operation." and "... the simulation modules are directly translated into target modules (e.g., modules compatible with and executable on a target system platform), thereby enabling the simulation tool to be utilized for system definition and requirements and software development."*); and

- testing means for testing presence or absence of abnormality in at least one of the control model and the control program based on output operation results with respect to each relational linkage (*see Column 6: 11-13, "When errors are encountered between actual and simulated results ..."*);

- wherein the synchronization means makes said each relational linkage about similar contents between the control model and the control program based on correspondence information which indicates a correspondence relationship between the control model which is provided at automatic generation of the control program by the automatic code generation means and the control program which is produced from the control model (*see Column 6: 38-51, "Templates 38 basically serve as a target module shell or skeleton, and initially contain information and code needed within target modules." and "Function set 40 is utilized to replicate on the target system platform simulation tool functions residing within the simulation modules. The function set basically performs substantially the same tasks as the corresponding simulation tool functions, but is modified for compatibility with the target system platform."*).

However, Whitehill does not disclose:

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- the simulation means and the program execution means being operated concurrently.

Hines discloses:

- the simulation means and the program execution means being operated concurrently
(see Paragraph [0525], "Debugging, in a coordination-centric approach, is performed using "cooperative execution." Cooperative execution refers to simultaneously executing a distributed software environment 4300 and simulating distributed software environment 4300 on debugging host 4306 based on event traces from distributed software environment 4300.").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Hines into the teaching of Whitehill to include the simulation means and the program execution means being operated concurrently. The modification would be obvious because one of ordinary skill in the art would be motivated to closely integrate the system design with the programming methodology (see Hines – Paragraph [0003]).

16. **Claims 15-24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Whitehill in view of Hines as applied to Claim 13 above, and further in view of Duboc.

As per **Claim 15**, the rejection of **Claim 13** is incorporated; however, Whitehill and Hines do not disclose:

- wherein the synchronizing means makes the relational linkage for one of the control model and the control program based on the setting of a break point which specifies a suspend

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point of operation and for the other based on setting of a corresponding break point based on the correspondence information.

Duboc discloses:

- wherein the synchronizing means makes the relational linkage for one of the control model and the control program based on the setting of a break point which specifies a suspend point of operation and for the other based on setting of a corresponding break point based on the correspondence information (*see Column 5: 6-15, "A debug operation may include any number of debugging functions, including for example, single-step operations and multi-step operations for use in performing step-wise simulation, breakpoint operations to halt a simulation on occurrence of specific events ..."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the synchronizing means makes the relational linkage for one of the control model and the control program based on the setting of a break point which specifies a suspend point of operation and for the other based on setting of a corresponding break point based on the correspondence information. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

As per **Claim 16**, the rejection of **Claim 15** is incorporated; and Whitehill further discloses:

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- the synchronization means causes simulation means and the program execution means to operate in a synchronized manner (*see Column 4: 44-49, "... the simulation modules are directly translated into target modules (e.g., modules compatible with and executable on a target system platform), thereby enabling the simulation tool to be utilized for system definition and requirements and software development."*).

However, Whitehill and Hines do not disclose:

- wherein the break point is set individually for functional blocks which constitute the control model.

Duboc discloses:

- wherein the break point is set individually for functional blocks which constitute the control model (*see Column 11: 48-51, "Window 110 may include a number of breakpoint selection controls 112 that permit a user to select various conditional breakpoints at which to stop execution of a simulation."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the break point is set individually for functional blocks which constitute the control model. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

As per **Claim 17**, the rejection of **Claim 13** is incorporated; and Whitehill further discloses:

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- the synchronization means causes simulation means and the program execution means to operate in a synchronized manner (*see Column 4: 44-49, "... the simulation modules are directly translated into target modules (e.g., modules compatible with and executable on a target system platform), thereby enabling the simulation tool to be utilized for system definition and requirements and software development."*).

However, Whitehill and Hines do not disclose:

- wherein output of operation result by the synchronizing means is implemented based on the execution and suspend of the control program, one line at a time, by the program execution means.

Duboc discloses:

- wherein output of operation result by the synchronizing means is implemented based on the execution and suspend of the control program, one line at a time, by the program execution means (*see Column 5: 6-15, "A debug operation may include any number of debugging functions, including for example, single-step operations and multi-step operations for use in performing step-wise simulation ..."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein output of operation result by the synchronizing means is implemented based on the execution and suspend of the control program, one line at a time, by the program execution means. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

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As per **Claim 18**, the rejection of **Claim 13** is incorporated; and Whitehill further discloses:

- comparing means which implements the testing of the presence or absence of abnormality by comparing successively between the operation results of the simulation means and the operation results of the program execution means in relational linkage (*see Column 9: 16-23, "The resulting templates are searched at step 94 to replace specific functions with functions compatible with the target system platform."*).

As per **Claim 19**, the rejection of **Claim 18** is incorporated; and Whitehill further discloses:

- wherein the successive comparison between the operation results of the simulation means and the operation results of the program execution means by the comparing means is implemented in terms of comparison between a simulation sequence of the control model and an execution sequence of the control program based on the correspondence information (*see Column 9: 16-23, "The resulting templates are searched at step 94 to replace specific functions with functions compatible with the target system platform."*).

As per **Claim 20**, the rejection of **Claim 18** is incorporated; and Whitehill further discloses:

- wherein the successive comparison between the operation results of the simulation means and the operation results of the program execution means by the comparison means is

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implemented in terms of comparison between variable values which are calculated by the simulation of the control model and variable values which are calculated by the execution of the control program based on the correspondence information (*see Column 9: 16-23, "... certain functions in the simulation tool define data streams in a particular manner. These functions are replaced with functions (e.g., typically included within function set 40) for compatibility with the target system platform to enable information to be transferred between functional elements."*).

As per **Claim 21**, the rejection of **Claim 20** is incorporated; however, Whitehill and Hines do not disclose:

- wherein the testing of the presence or absence of abnormality by comparison between variable values calculated by the simulation of the control model and variable values calculated by the execution of the control program based on the correspondence information is implemented in terms of determination as to whether or not the difference between the variable values calculated by the simulation of the control model and the variable values calculated by the execution of the control program is within an allowable range.

Duboc discloses:

- wherein the testing of the presence or absence of abnormality by comparison between variable values calculated by the simulation of the control model and variable values calculated by the execution of the control program based on the correspondence information is implemented in terms of determination as to whether or not the difference between the variable values calculated by the simulation of the control model and the variable values calculated by the execution of the control program is within an allowable range (*see Column 14: 31-43, "... more*

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complex breakpoint conditions may be used, e.g., whether a monitored node has a state that is greater than or less than a certain value, whether the monitored node has a state in a certain range, etc. ").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include wherein the testing of the presence or absence of abnormality by comparison between variable values calculated by the simulation of the control model and variable values calculated by the execution of the control program based on the correspondence information is implemented in terms of determination as to whether or not the difference between the variable values calculated by the simulation of the control model and the variable values calculated by the execution of the control program is within an allowable range. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (see Duboc – Column 2: 46-51).

As per **Claim 22**, the rejection of **Claim 18** is incorporated; however, Whitehill and Hines do not disclose:

- producing, in the event of determination of the presence of abnormality by the comparing means, a simulation spot of the control model and an execution spot of the control program at a time point of the determination as a result of the test.

Duboc discloses:

- producing, in the event of determination of the presence of abnormality by the comparing means, a simulation spot of the control model and an execution spot of the control

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program at a time point of the determination as a result of the test (*see Column 14: 44-52, "Once all active breakpoints have been tested, block 236 determines whether any breakpoint was hit. If so, control passes to block 224 to halt the simulation. In addition, it may be desirable to pass a message to the script via the message pipe to indicate that the breakpoint was hit. If no breakpoint is hit, however, block 236 passes control to block 204 to indicate the end of a clock cycle, whereby control then returns to block 200 to wait for the next cycle of the simulation."*).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include producing, in the event of determination of the presence of abnormality by the comparing means, a simulation spot of the control model and an execution spot of the control program at a time point of the determination as a result of the test. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design (*see Duboc – Column 2: 46-51*).

As per **Claim 23**, the rejection of **Claim 13** is incorporated; however, Whitehill and Hines do not disclose:

- making alterable at least one of variable values held at a suspend point among variable values calculated by the simulation of the control model and variable values held at the suspend point among variable values calculated by the execution of the control program when the simulation of the control model and the execution of the control program are suspended during the test.

Duboc discloses:

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- making alterable at least one of variable values held at a suspend point among variable values calculated by the simulation of the control model and variable values held at the suspend point among variable values calculated by the execution of the control program when the simulation of the control model and the execution of the control program are suspended during the test *(see Column 14: 10-15, "Next, block 222 determines whether the single-step mode is activated. If so, control passes to block 224 to halt the simulation and return control to the user to either update the debug parameters, view the current results, or perform other activities until the user specifically commands the simulator to restart the simulation on the next clock cycle.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include making alterable at least one of variable values held at a suspend point among variable values calculated by the simulation of the control model and variable values held at the suspend point among variable values calculated by the execution of the control program when the simulation of the control model and the execution of the control program are suspended during the test. The modification would be obvious because one of ordinary skill in the art would be motivated to verify the proper interaction of the core with other components in a design *(see Duboc – Column 2: 46-51)*.

As per **Claim 24**, the rejection of **Claim 13** is incorporated; however, Whitehill and Hines do not disclose:

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- display means which is adapted to display visually at least the operation results of the simulation means which simulates the operation of the control model and the operation results of the program execution means which executes the control program.

Duboc discloses:

- display means which is adapted to display visually at least the operation results of the simulation means which simulates the operation of the control model and the operation results of the program execution means which executes the control program (see Column 7: 39-45,

"Communication between the debug GUI script 44 and debug monitor 52 is provided through a communications channel 54, with debug parameters used to configure the debug monitor transmitted from the debug GUI script 44 to the debug monitor, and with results of the debug operations transmitted by the debug monitor 52 to the script for display to the user.").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Duboc into the teaching of Whitehill to include display means which is adapted to display visually at least the operation results of the simulation means which simulates the operation of the control model and the operation results of the program execution means which executes the control program. The modification would be obvious because one of ordinary skill in the art would be motivated to provide user with test information.

Response to Arguments

17. Applicant's arguments filed on September 4, 2007 have been fully considered, but they are not persuasive.

In the remarks, Applicant argues that:

a) Whitehill teaches generating from a simulation model a software (program) operable on a target system, and comparing results to check abnormality. The teachings of Whitehill is similar to what is described as the background art in the present specification (pages 2-3). However, Whitehill fails to teach defining a plurality relational linkages between similar contents in the model and the program, and checking abnormality with respect to each relational linkage.

Examiner's response:

a) Examiner disagrees. The claimed invention describes that a relational linkage is made about similar contents based on correspondence information between the control model and the control program. Whitehill discloses that a function set is used to replicate the simulation tool functions on the target modules via a translation module. The function set performs the same tasks as the corresponding simulation tool functions (*see Column 6: 46-51*). Thus, the simulation tool functions and the function set are the correspondence information between the control model and the control program. Since the simulation modules are directly translated into target modules, the simulation tool can be utilized for system definition and requirements and software development (*see Column 4: 44-49*). In other words, the functionalities of the simulation modules and the target modules are synchronized.

Whitehill also discloses that the target modules are tested and compared to the simulation to verify target system operation (*see Column 4: 39-41*). Note that the target modules perform all the corresponding simulation tool functions by utilizing the function set.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Qing Chen whose telephone number is 571-270-1071. The Examiner can normally be reached on Monday through Thursday from 7:30 AM to 4:00 PM. The Examiner can also be reached on alternate Fridays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Wei Zhen, can be reached on 571-272-3708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2100 Group receptionist whose telephone number is 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

QC / ac
November 7, 2007

MARY STEELMAN
PRIMARY EXAMINER

